German Patent Application No. 100 21 320.0 filed May 2, 2000.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a twin-wire former for producing a fibrous web, in particular a paper, board or tissue web, from a fibrous suspension. The twin-wire former includes two endless wire belts arranged to form a twin-wire zone, in which, in a first section of the twin-wire zone, the two wire belts run over a dewatering element in the form of a rotating forming roll and together form a wedge-like inlet gap which picks up the fibrous stock suspension directly from a flowbox fitted at an angle relative to an imaginary first horizontal plane, and in which, in a second section of the twin-wire zone, the two wire belts with the fibrous web forming between them run downward over further dewatering elements at an angle (α) of 10° to 60° relative to an imaginary first vertical plane. At the end of the second section of the twin-wire zone, the two wire belts run over a first deflection device with a lower vertex and then over at least one separating device which acts over the machine width and, in the area in which one of the wire belts is led away from the forming fibrous web and the other wire belt. A second deflection device with an upper vertex is arranged after the separating device to deflect the wire belt that carries the forming fibrous web.

2. Discussion of Background Information---

Please replace the first and second full paragraphs on page 2 (between lines 1 and

18) with the following heading and amended paragraphs:

---SUMMARY OF THE INVENTION

Therefore, the instant invention provides a twin-wire former of the type mentioned at the beginning in such a way that the overall height is reduced such that, during rebuilds, no significant additional costs (rebuilding costs, overhaul costs, operating costs) arise and that, at relatively high machine speeds, complete secondary dewatering is made possible.

B2

In the case of a first twin-wire former of the type mentioned at the beginning, after the first deflection device, the two wire belts run upward at an angle relative to an imaginary second horizontal plane, in that the upper vertex of the second deflection device is located above the lower vertex of the first deflection device, and in that the angle between the flowbox and the imaginary first horizontal plane runs downward.---

Please replace the first full paragraph on page 3 (between lines 7 and 22) with the following amended paragraph:

B3

---In the case of a second twin-wire former of the type mentioned at the beginning, after the first deflection device, the two wire belts run upward at an angle relative to an imaginary second horizontal plane, in that a felt removes the forming fibrous web from the wire belt at a pickup point which is located above the lower vertex of the first deflection device, and in that the pickup point is followed by a press unit, in which the forming fibrous web is guided first through a first, preferably double-felted press nip with a first press roll

B3

and a second press roll, after the first press nip is guided, with one of the felts, around the first press roll, is then transferred to a non-felted press roll in a second press nip and then runs through at least one further single-side-felted press nip.---

Please add the following new paragraphs between the first and second full paragraphs on page 7 (at line 13):

---The present invention directed to a twin-wire former for producing a fibrous web from a fibrous stock suspension that includes two endless wire belts arranged to form a twin-wire zone having at least a first and second section. A first dewatering element is located in the first section, in which the two endless wire belts are arranged to run over at least a portion of the first dewatering element, and the two endless wire belts are further arranged to form a wedge-like inlet gap. A flowbox is arranged obliquely to a horizontal reference to supply a fibrous stock suspension to the inlet gap. A second dewatering element is located in the second section, in which the two endless wire belts, and the forming fibrous web located between the two endless wire belts, are arranged to run obliquely downward, relative to a vertical reference, over the second dewatering element. A first deflection device is located at an end of the second section, in which the two endless wire belts are arranged to run over a lower vertex of the first deflection device, and at least one separating device is structured and arranged to act over an entire machine width and located in a region at which a first of two endless wire belts is led away from a second endless wire belt carrying the forming

B4

fibrous web. A second deflection device, located after the separating device, relative to a belt travel direction, is arranged to deflect the second endless wire carrying the forming fibrous web over an upper vertex of the second deflection device. After the first deflection device, the two endless wire belts are arranged to run upward at an angle to the horizontal reference such that the upper vertex is located above the lower vertex, and, after the second deflection device, the second endless wire carrying the forming web is arranged to run downward at an angle to the horizontal reference.

According to a feature of the instant invention, the upper vertex is located at least 50 mm above the lower vertex, preferably at least 100 mm above the lower vertex, and most preferably at least 200 mm above the lower vertex.

In accordance with another feature of the invention, the angle of the downward run after the second deflection device is between 0° and 45°, and preferably between 0° and 30°.

According to still another feature of the present invention, the fibrous web includes at one of a paper, board, or tissue web.

Moreover, the first dewatering device includes a rotating forming roll, which has a diameter greater than 1200 mm, preferably greater than 1635 mm, and most preferably greater than 1760 mm. Further, the forming roll has a dewatering capacity of at least 50% of a total dewatering capacity of the twin-wire former, and preferably the dewatering capacity of the forming roll is at least 65% of the total dewatering capacity of the twin-wire former.

The forming roll includes an open roll, and the open forming roll is closed by one of a grill and honeycomb structure. Further, the open forming roll includes a suction roll.

According to the invention, the second dewatering device includes a plurality of dewatering elements.

B4 In accordance with a further feature of the invention, the oblique downward run of the two endless wire belts is between 10° and 60°.

The twin-wire former in accordance with the instant invention further includes isobaric dewatering elements positioned between the first deflection device and the separating device. The isobaric dewatering elements are arranged such that the two endless wire belts and the forming fibrous material between the two endless wire belts are guided between the isobaric dewatering elements. Further, at least one stationary isobaric dewatering element is arranged on either the first or second endless wire and at least one other isobaric dewatering element is arranged on the other of the first or second endless wire. The at least one other isobaric dewatering element can be set resiliently against the other of the first or second endless wire with a selectable force. Still further, the isobaric dewatering elements include at least one of plates and plate segments.

According to a feature of the invention, the twin-wire former further includes at least one flat suction element, positioned after the separating device, that is structured and arranged to act on the second endless wire carrying the forming fibrous web.

In accordance with a further feature of the present invention, the angle of the downward run of the second endless wire carrying the forming web is less than 60°, preferably less than 40°, and most preferably less than 25°.

According to another feature of the invention, the second endless wire carrying the forming web is arranged so that, after the second deflection device, the second endless wire is substantially horizontally guided. Further, the second endless wire runs over the lower vertex, the second endless wire runs at least 50 mm above the lower vertex, and preferably at least 100 mm above the lower vertex.

The twin-wire former further includes a sheet forming device is arranged after the second deflection device relative to the belt travel direction. The sheet forming device includes a hybrid former.

The second deflection device includes one of a suction roll, a shoe with foils, and a shoe with foils with an applied vacuum.

A distance between the lower vertex and the upper vertex is between 1 and 8 m, and preferably between 3 and 6 m.

In accordance with a still further feature of the instant invention, the first deflection device includes one of a closed roll, an open roll, and an open roll with an applied vacuum.

Further, the separating device includes at least one of a suction separator and a vacuum shoe.

The first deflection device includes a first deflection roll and the second deflection device comprises a second deflection roll, and the first deflection roll has a roll diameter is greater than a diameter of at least one of the forming roll and the second deflection roll. Further, the second deflection roll includes a suction roll.

According to the invention, an overall height of the twin-wire former is between 2 and 8 m, and preferably between 3 and 6 m.

B4

The present invention is directed to a twin-wire former for producing a fibrous web from a fibrous stock suspension that includes two endless wire belts arranged to form a twin-wire zone having at least a first and second section. A first dewatering element is located in the first section, in which the two endless wire belts are arranged to run over at least a portion of the first dewatering element, and the two endless wire belts are further arranged to form a wedge-like inlet gap. A flowbox is arranged obliquely to a horizontal reference to supply a fibrous stock suspension to the inlet gap. A second dewatering element is located in the second section, in which the two endless wire belts, and the forming fibrous web located between the two endless wire belts, are arranged to run obliquely downward, relative to a vertical reference, over the second dewatering element. A first deflection device is located at an end of the second section, in which the two endless wire belts are arranged to run over a lower vertex of the first deflection device, and at least one separating device is structured and arranged to act over an entire machine width and located in a region at which a first of

two endless wire belts is led away from a second endless wire belt carrying the forming fibrous web. A second deflection device, located after the separating device, relative to a belt travel direction, is arranged to deflect the second endless wire carrying the forming fibrous web over an upper vertex of the second deflection device, such that, after the first deflection device, the two endless wire belts are arranged to run upward at an angle to the horizontal reference. A felt is arranged to remove the forming fibrous web from the second endless wire belt at a pickup point located above the lower vertex, and a press unit, arranged to follow the pickup point, relative to a belt travel direction, includes a first and second press roll arranged to form a first press nip and third press roll arranged to form a second press nip, and a fourth press roll arranged to form a single side felted third press nip.

In accordance with a feature of the invention, the first press nip includes a double-felted press nip, and the third press roll includes a non-felted press roll. One of the felts of the double-felted press nip guide the forming fibrous web through the second press nip. Further, the non-felted press roll transfers the forming fibrous web to the third press nip.

According to another feature of the invention, the pickup point is located at least 50 mm above the lower vertex, preferably at least 100 mm above the lower vertex, and most preferably at least 200 mm above the lower vertex.

According to the invention, the angle of the upward run of the two endless wire belts after the first deflection device is between 10° and 90°, and preferably between 25° and 40°.

The present invention is directed to a process of dewatering a web in an apparatus that includes two endless wire belts arranged to form a twin-wire zone having at least a first and second section, a first dewatering element located in the first section and the two endless wire belts being arranged to form a wedge-like inlet gap, a flowbox arranged obliquely to a horizontal reference in a vicinity of the inlet gap, a second dewatering element located in the second section, a first deflection device, located at an end of the second section, having a lower vertex, at least one separating device structured and arranged to act over an entire machine width, and a second deflection device located after the separating device, relative to a belt travel direction. The process includes supplying a fibrous stock suspension into the inlet gap, such that a forming fibrous web is located between the two endless wire belts, and guiding the forming fibrous web and the two endless wires over at least a portion of the first dewatering element. The process also includes guiding the forming fibrous web and the two endless wire belts obliquely downward, relative to a vertical reference, over the second dewatering element, and guiding the forming fibrous web and the two endless wire belts over the lower vertex of the first deflection device. After the first deflection device, the process includes guiding the two endless wire belts to run upward at an angle to the horizontal reference, such that the lower vertex of the first deflection device is located below the upper vertex of the second deflection device, separating a first of the two endless wire belts from a second endless wire belt carrying the forming fibrous web in a region of the separating

device, and guiding the second endless wire belt carrying the forming fibrous web over the second deflection device. After the second deflection device, the process includes guiding the second endless wire carrying the forming web to run downward at an angle to the horizontal reference.

B4 In accordance with yet another feature of the present invention, the apparatus further includes a felt and a press unit, and the process further includes removing the forming fibrous web from the second endless wire belt with the felt at a pickup point located above the lower vertex, and pressing the forming fibrous web in the press unit, arranged to follow the pickup point, relative to a belt travel direction, which includes a first and second press roll arranged to form a first press nip and third press roll arranged to form a second press nip, and a fourth press roll arranged to form a single side felted third press nip.---

Please add the following heading between the second and third full paragraphs on page 7 (on line 20):

B5 ---BRIEF DESCRIPTION OF THE DRAWINGS---

Please add the following heading before the first full paragraph on page 8 (before line 1):

B6 ---DETAILED DESCRIPTION OF THE PRESENT INVENTION---

Please replace the headings at the top of page 17 with the following:

---WHAT IS CLAIMED:---